

N79-31172 ^{D6}

**GLOBAL ENCLOSURE FIRE MODELING
WITH APPLICATIONS
FIREMEN**

**FIRE MODELING AND SCALING METHODS
510-56-05**



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OUTLINE

- BRIEF REVIEW OF LERC LIMITING ENERGY RELEASE CRITERIA
- APPLICATION OF LERC TO JSC/BOEING IGNITION SOURCE FULL-SCALE TESTS
- APPLICATION OF LERC TO JSC/DACFIR MATH-MODEL VALIDATION-TESTS



LIMITING ENERGY RELEASE CRITERIA-LERC

FLAME SPREAD RATE

$$\dot{Q}_S = (\dot{Q}/A) bvt \quad (\text{LINEAR})$$

FUEL SURFACE LIMIT

$$\dot{Q}_f = 2500 A_f \quad (\text{GASOLINE})$$

VENTILATION LIMIT

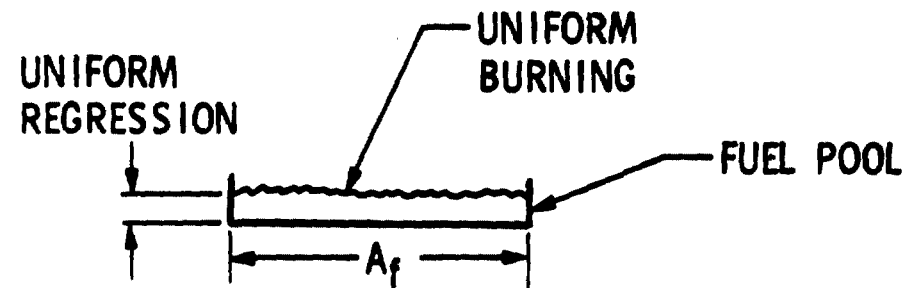
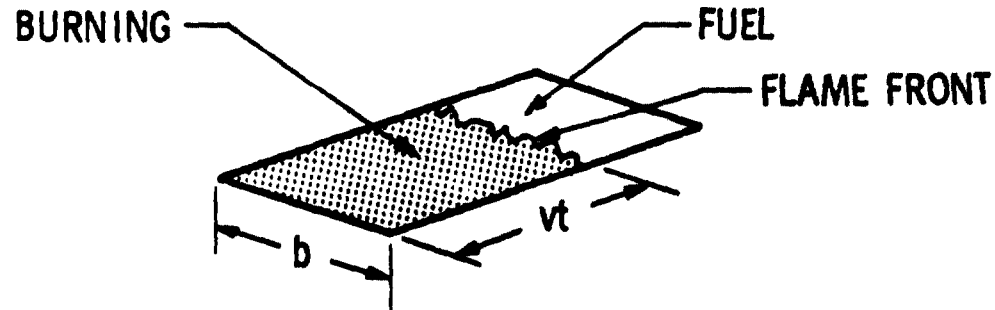
$$\dot{Q}_v = 1580 AH^{1/2}$$

ENCLOSURE VOLUME

$$t_e = \frac{58V_e}{\dot{Q}}$$

FUEL LOAD

$$t_e = \frac{M_f \Delta H}{\dot{Q}}$$



COMBINED CRITERIA OXYGEN SUPPLY

$$t_e = \frac{Q_e}{2\dot{Q}} (1 - \dot{Q}_v/\dot{Q})^{-1}$$

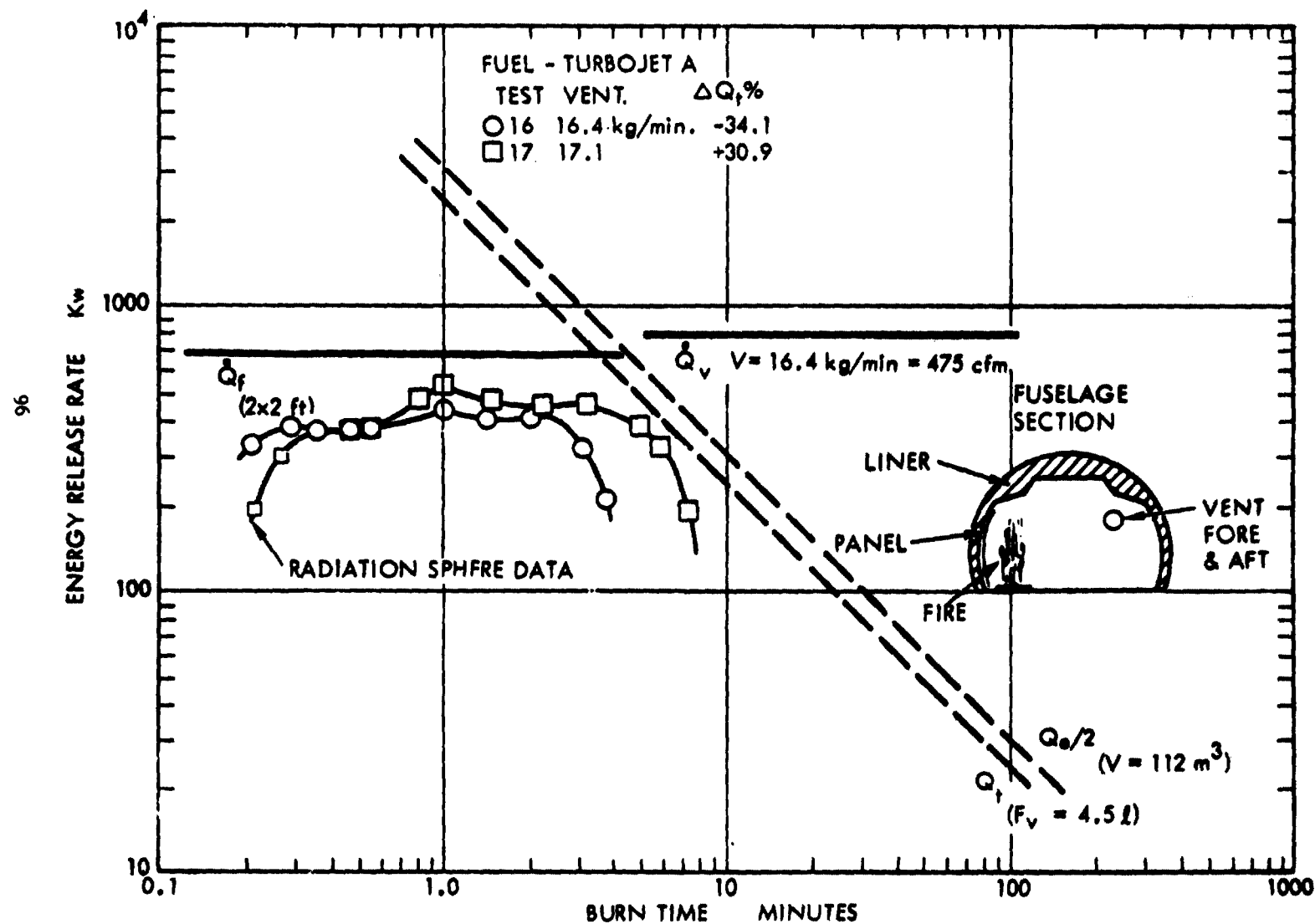
$$Q_e = 58V_e$$

UNITS :
KILOWATTS
METERS
KILOGRAMS
MINUTES



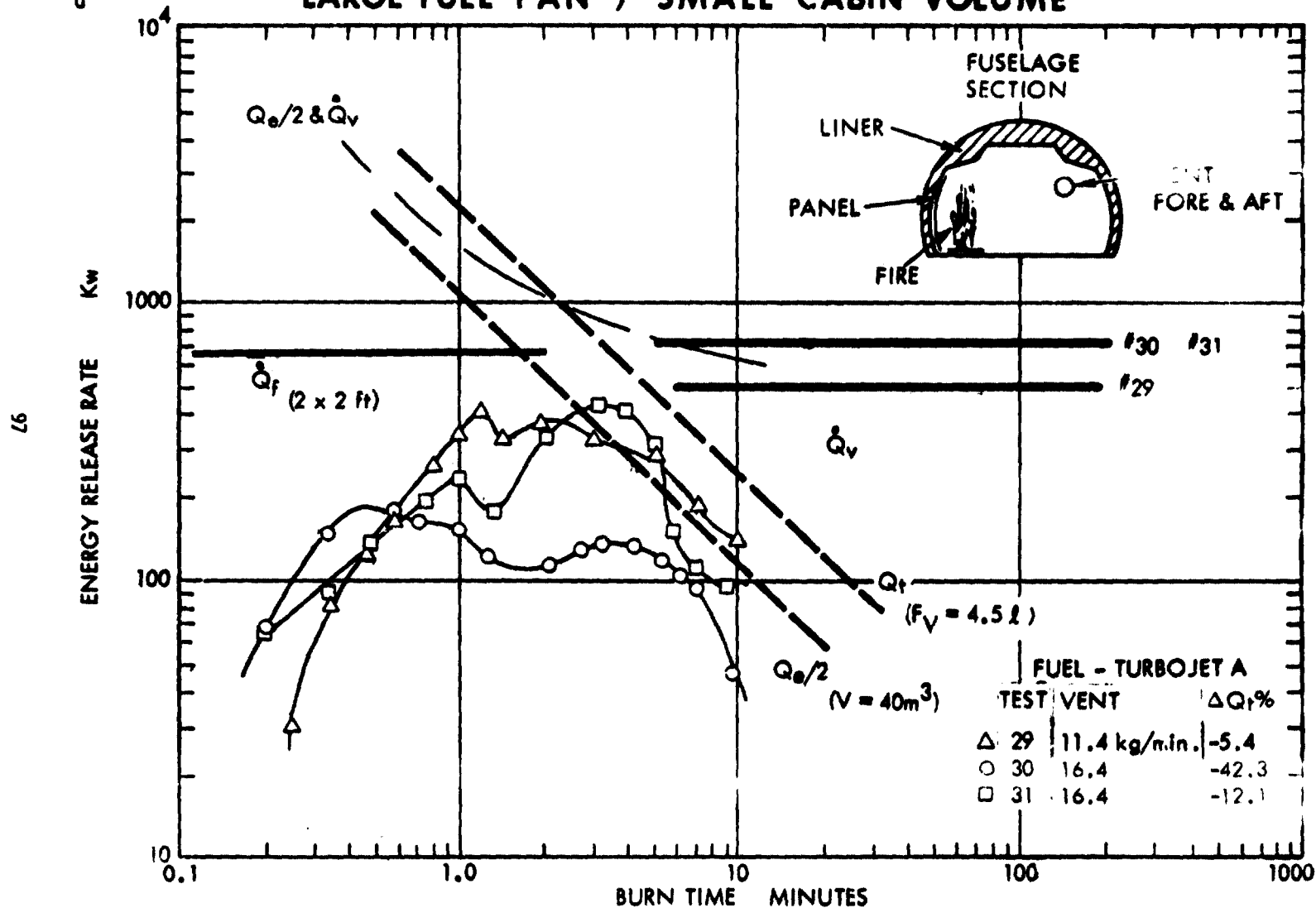
DATA VARIABILITY

LARGE FUEL PAN / LARGE CABIN VOLUME





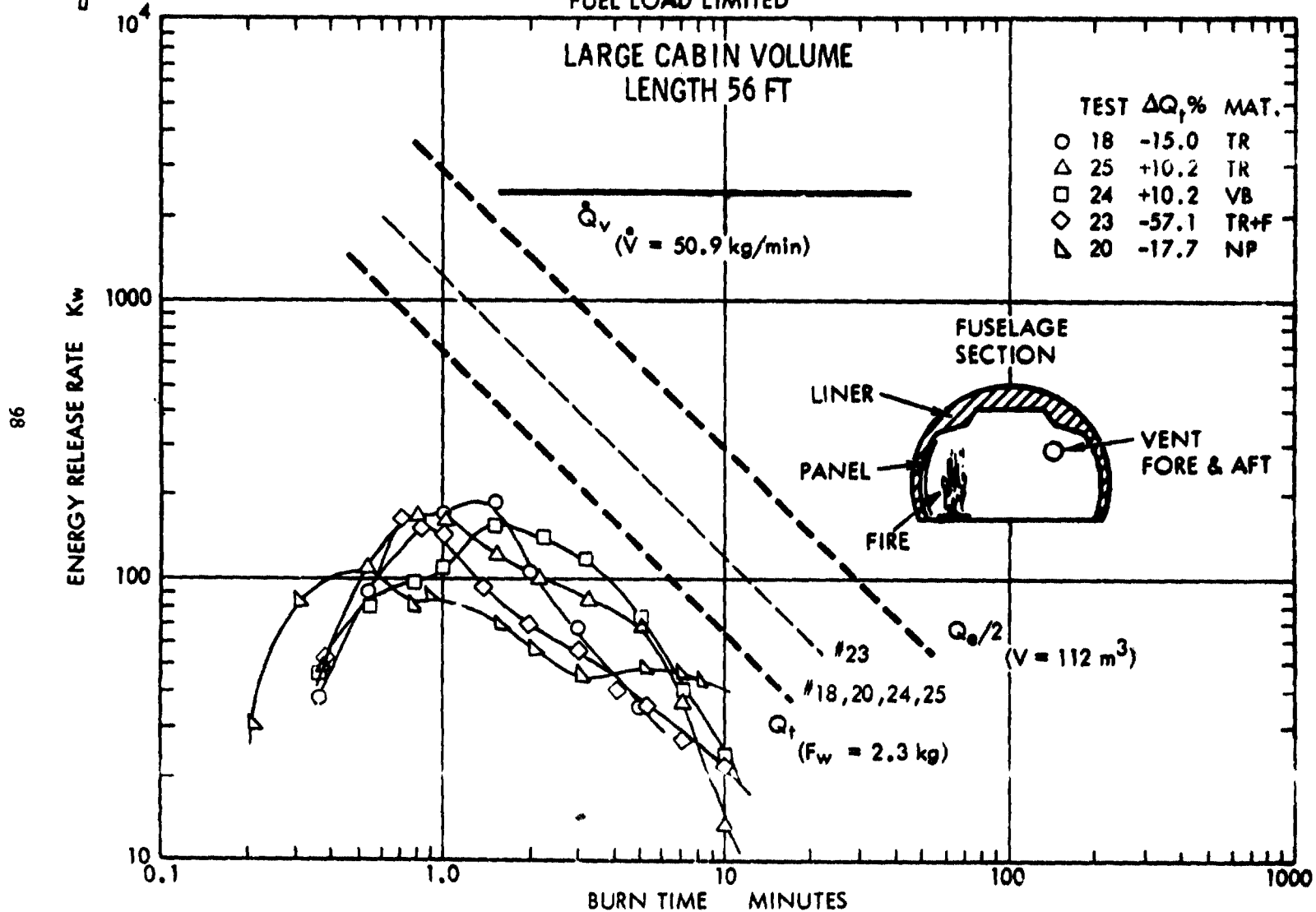
DATA VARIABILITY AND COMPARISON LARGE FUEL PAN / SMALL CABIN VOLUME





COMPARATIVE TRASH FUEL

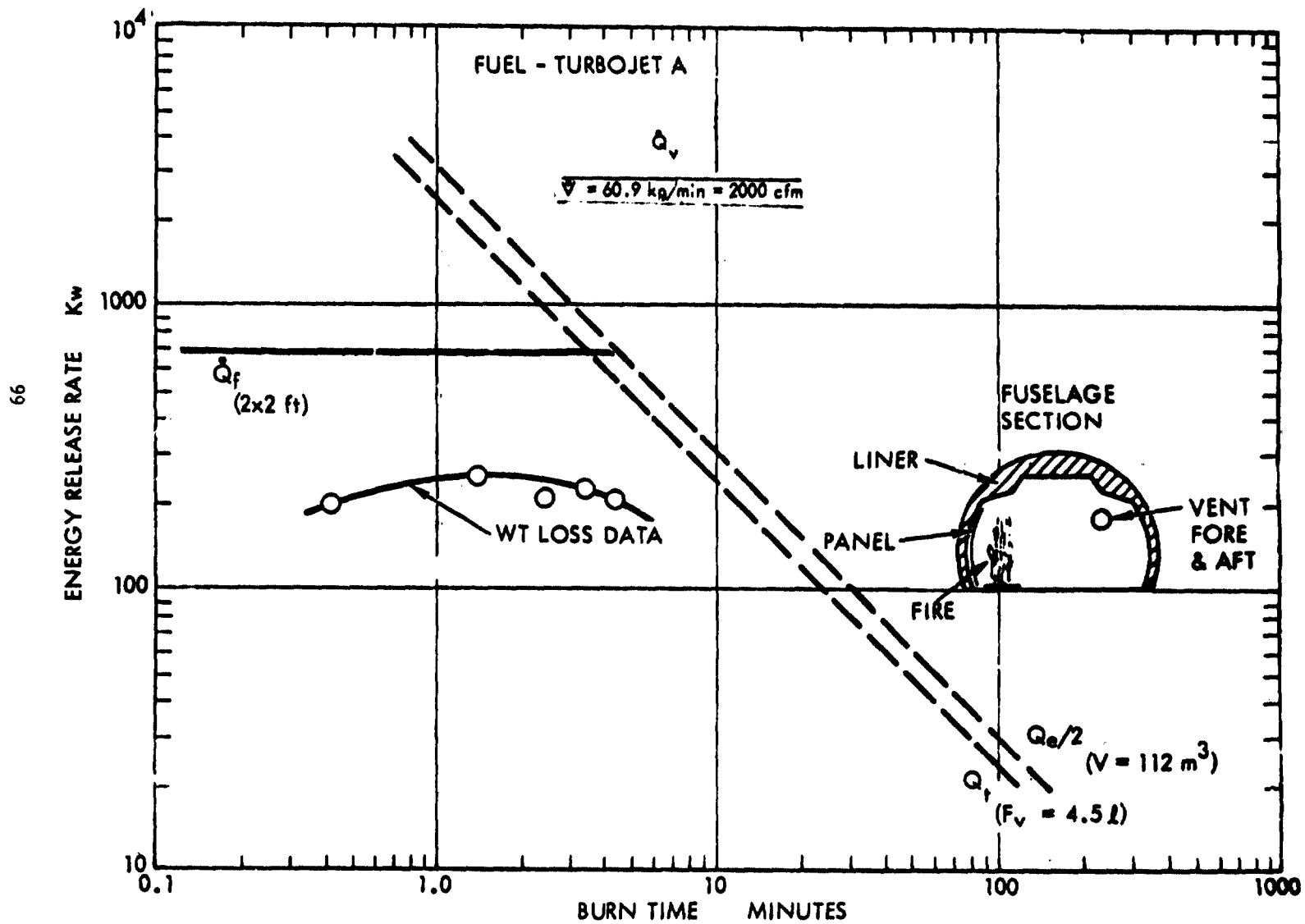
FUEL LOAD LIMITED

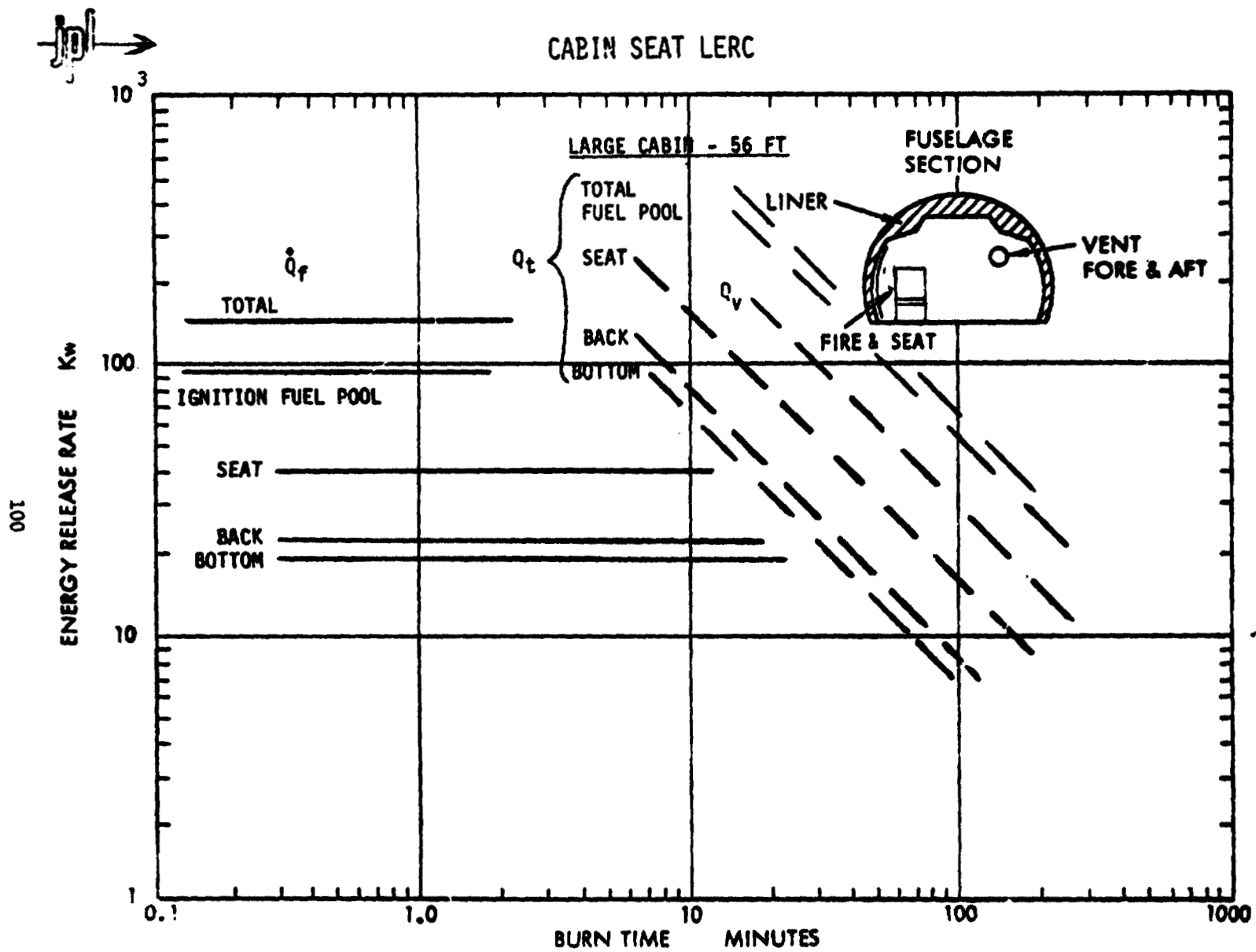




DATA VARIABILITY

LARGE FUEL PAN / LARGE CABIN VOLUME







CONCLUSIONS

- A COMPLETE LERC APPLICATION TO THE JSC/BOEING TESTS VERIFIES THE FUEL LOAD CRITERION AS THE CONSISTENT LIMITING CONSTRAINT
- THE VARIABILITY OF MAGNITUDE AND FORM OF THE RESULTS OF REPEATED TESTS WITH AND WITHOUT SMALL VARIATIONS IN PARAMETERS EMPHASIZES THE SIGNIFICANCE OF THE LOCAL FLOW, SPECIES-CONCENTRATION, AND HEAT-TRANSFER DISTRIBUTIONS
- WEIGHT-LOSS MEASUREMENTS OF RECENT JSC TESTS SHOW CONSISTENT RESULTS WITH PRIOR METHODS; FUEL LOAD CONSTRAINED